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NATIONAL EUTROPHICATION SURVEY

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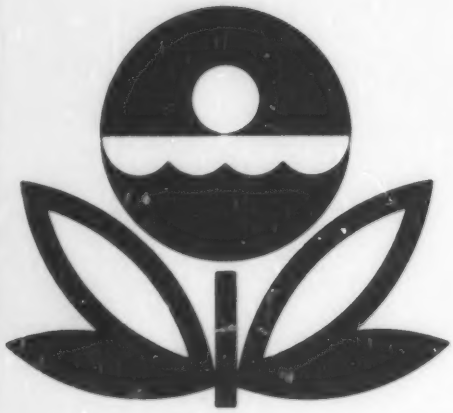

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REPORT

ON

LAKE KEOWEE

OCONEE AND PICKENS COUNTIES

SOUTH CAROLINA

EPA REGION IV

WORKING PAPER No. 433

WITH THE COOPERATION OF THE

SOUTH CAROLINA DEPARTMENT OF HEALTH AND

ENVIRONMENTAL CONTROL

AND THE

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the South Carolina Department of Health and Environmental Control for professional involvement, to the South Carolina National Guard for conducting the tributary sampling phase of the Survey, and to those South Carolina wastewater treatment plant operators who voluntarily provided effluent samples and flow data.

The staff of the South Carolina Bureau of Wastewater and Stream Quality Control provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

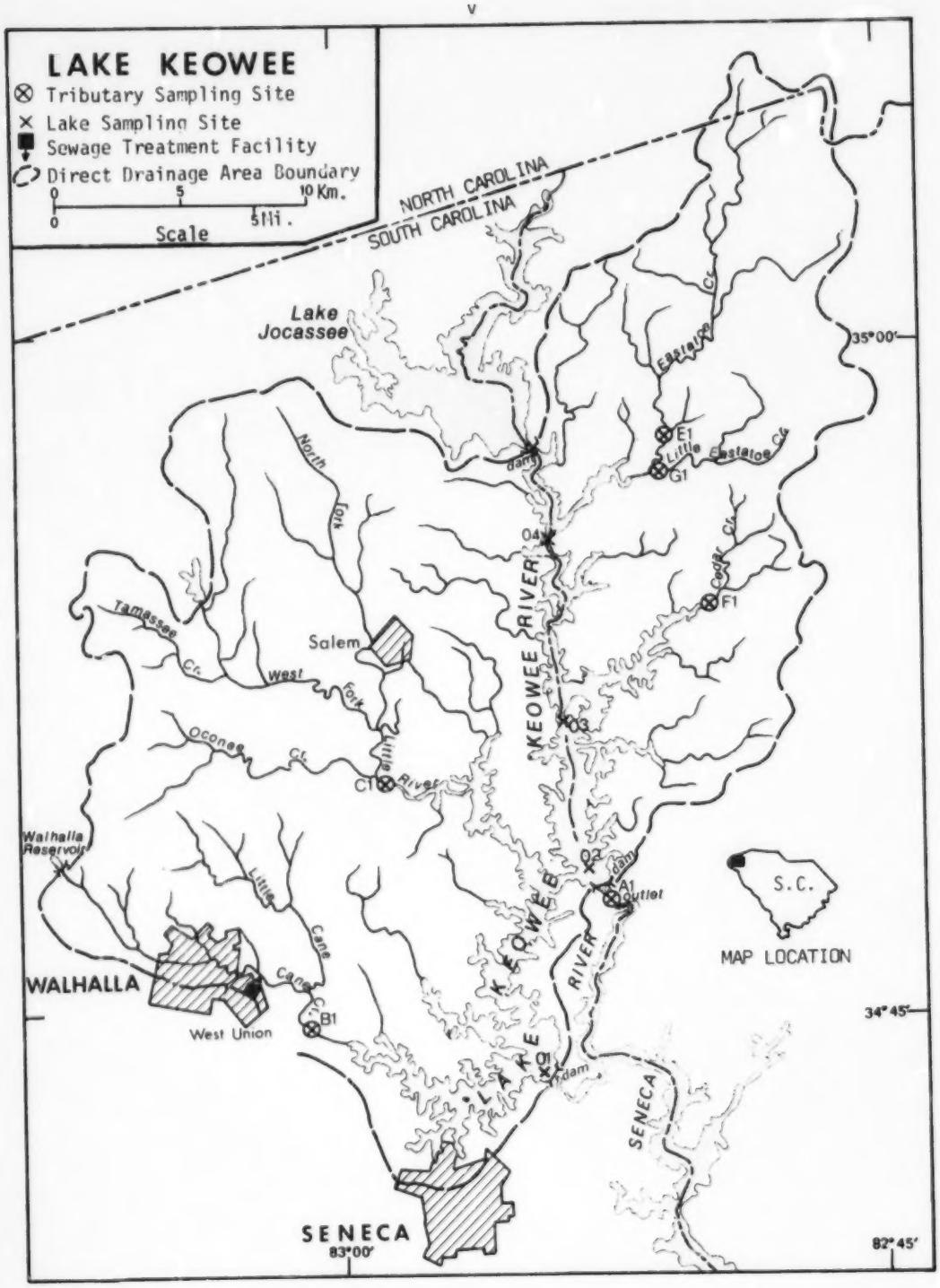
Major General Robert L. McCrady, the Adjutant General of South Carolina, and Project Officer Lt. Colonel John P. DuPre (Retired), who directed the volunteer efforts of the South Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF SOUTH CAROLINA

NAME	COUNTY
Clark Hill	Abbeville, McCormick, SC; Columbia, Elbert, Lincoln, McDuffie, Wilks, GA
Fishing Creek	Chester, Lancaster
Greenwood	Greenwood, Laurens, Newberry
Hartwell	Anderson, Oconee, Pickens, SC; Franklin, Hart, Stephens, GA
Keowee	Oconee, Pickens
Marion	Berkeley, Calhoun, Claredon, Orangeburg, Sumter
Moultrie	Berkeley
Murray	Lexington, Newberry, Richland, Saluda
Robinson	Chesterfield, Darlington
Saluda	Greenville, Pickens
Secession	Abbeville, Anderson
Wateree	Fairfield, Kershaw, Lancaster
William C. Bowen	Spartanburg
Wylie	York, SC; Gaston, Mecklenburg, NC


LAKE KEOWEE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Direct Drainage Area Boundary
0 5 10 Km.
0 5 Mi.
Scale
NORTH CAROLINA
SOUTH CAROLINA
Lake Jocassee
Eastatoe Cr.
35°00'
E1
Little Eastatoe Cr.
G1
dam
North Fork
04
Toxaway Cr.
F1
KEOWEE RIVER
Tamassee Cr.
Salem
West Fork
03
Oconee Cr.
C1
Little River
Walhalla Reservoir
02
dam
A1
outlet
S.C.
MAP LOCATION
Little Cane Cr.
WALHALLA
West Union
B1
34°45'
LAKE KEOWEE
01
dam
RIVER
SENECA
SENECA
83°00'
82°45'

LAKE KEOWEE

STORET NO. 4513

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Lake Keowee is mesotrophic. It ranked first in overall trophic quality when the 13 South Carolina lakes sampled in 1973 were compared using a combination of six parameters*. None of the other lakes had less median total phosphorus and median dissolved orthophosphorus, one had less median inorganic nitrogen, two had less mean chlorophyll a, and none of the other lakes had greater mean Secchi disc transparency. Marked depression of hypolimnetic dissolved oxygen occurred at sampling stations 1, 2, and 3 in September and November and at station 4 in June and November; depletion occurred at station 4 in September.

Survey limnologists did not observe any nuisance conditions during sampling visits. However, it is reported that the upper portion of the Cane Creek embayment is eutrophic and often supports nuisance populations of blue-green algae (Anonymous, 1973). The same source indicates algal blooms occur throughout the lake, but the Survey phytoplankton data do not indicate bloom conditions during the sampling year (see page 6).

B. Rate-Limiting Nutrient:

The algal assay results indicate Lake Keowee was phosphorus

* See Appendix A.

limited at the time the sample was collected (06/25/73). The lake data indicate phosphorus limitation at all sampling stations and times.

C. Nutrient Controllability:

1. Point sources--The only known municipal point source (Walhalla) contributed an estimated 6.8% of the total phosphorus input to Lake Keowee during the sampling year. While even complete removal of phosphorus at the Walhalla wastewater treatment facility would not appreciably lower the overall lake loading of 0.31 g/m^2 measured during the sampling year, it is likely that a high degree of phosphorus control would result in a significant improvement in the trophic condition of the Cane Creek embayment.

2. Non-point sources--The non-point contributions of sampled tributaries accounted for an estimated 81.1% of the total phosphorus load reaching the lake during the sampling year. This may be an overestimate to some degree because of a number of small unsampled domestic and industrial point sources in the Lake Keowee drainage (see page 9). However, the phosphorus export rates of the tributaries were comparatively low (see page 11) and indicate point-source impacts probably were not significant.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 69.41 kilometers^2.
2. Mean depth: 15.2 meters.
3. Maximum depth: 47.2 meters.
4. Volume: 1,055.078 x 10^6 m^3.
5. Mean hydraulic retention time: 1.1 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Keowee River	562.0	19.10
Little River	184.4	4.57
Eastatoe Creek	112.4	2.75
Cane Creek	80.3	1.97
Cedar Creek	19.9	0.48
Little Eastatoe Creek	31.1	0.76
Minor tributaries & immediate drainage -	77.5	1.89
Totals	1,067.6	31.52

2. Outlet -

Seneca River	1,137.0**	31.52

C. Precipitation***:

1. Year of sampling: 188.0 centimeters.
2. Mean annual: 149.6 centimeters.

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† Table of metric conversions--Appendix B.
†† Mast, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Keowee was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at four stations on the lake (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 36.6 meters at station 1, 48.8 meters at station 2, 32.3 meters at station 3, and >21.0* meters at station 4.

The sampling results are presented in full in Appendix D and are summarized in the following table.

* The maximum sampling depth at station 4 in November was indicated to be 61 meters or nearly 13 meters more than the maximum depth of the lake; the maximum depth sampled at that time is not known.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE KEOWEE
STORET CODE 4513

PARAMETER	1ST SAMPLING (6/25/73) 4 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/17/73) 4 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/13/73) 4 SITES RANGE	MEAN	MEDIAN
TEMP (C)	9.9 - 29.0	18.9	17.4	9.7 - 27.2	20.9	22.7	8.0 - 19.8	13.8	15.7
DISS OXY (MG/L)	2.2 - 9.8	6.6	6.7	0.0 - 8.4	4.2	3.6	1.0 - 9.4	5.0	4.5
CNDCTVY (MCROMO)	50. - 50.	50.	50.	25. - 51.	31.	30.	13. - 37.	20.	17.
PH (STAND UNITS)	6.3 - 7.1	6.6	6.6	5.7 - 6.9	6.1	6.0	5.6 - 6.6	6.1	6.2
TOT ALK (MG/L)	12. - 21.	16.	16.	10. - 15.	11.	11.	10. - 19.	12.	11.
TOT P (MG/L)	0.006 - 0.018	0.009	0.008	0.004 - 0.011	0.007	0.007	0.005 - 0.084	0.013	0.007
ORTHO P (MG/L)	0.002 - 0.007	0.002	0.002	0.002 - 0.010	0.005	0.004	0.002 - 0.008	0.003	0.003
NO2+NO3 (MG/L)	0.040 - 0.270	0.150	0.145	0.020 - 0.250	0.116	0.120	0.020 - 0.230	0.071	0.080
AMMONIA (MG/L)	0.020 - 0.080	0.052	0.050	0.030 - 0.370	0.055	0.040	0.020 - 0.100	0.039	0.030
KJEL N (MG/L)	0.200 - 0.500	0.223	0.200	0.200 - 1.100	0.271	0.200	0.200 - 0.500	0.223	0.200
INORG N (MG/L)	0.090 - 0.340	0.203	0.205	0.050 - 0.390	0.171	0.170	0.040 - 0.270	0.110	0.110
TOTAL N (MG/L)	0.240 - 0.600	0.374	0.365	0.240 - 1.120	0.387	0.335	0.220 - 0.520	0.295	0.290
CHLRPYL A (UG/L)	3.0 - 5.9	5.0	5.6	1.3 - 4.2	2.4	2.0	0.5 - 1.3	1.1	1.2
SECCHI (METERS)	2.1 - 3.7	2.8	2.7	2.5 - 3.3	2.9	3.0	3.4 - 4.6	4.0	4.1

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
06/25/73	1. Melosira sp.	915
	2. Cyclotella sp.	730
	3. Dinoflagellates	74
	4. Flagellates	49
	5. Merismopedia sp.	49
	Other genera	125
	Total	1,942
09/17/73	1. Roya sp.	231
	2. Melosira sp.	94
	3. Gloeothece sp.	73
	4. Lyngbya sp.	42
	5. Oscillatoria sp.	31
	Other genera	196
	Total	667
11/13/73	1. Crucigenia sp.	17
	2. Melosira sp.	13
	3. Cyclotella sp.	9
	4. Scenedesmus sp.	9
	5. Coelastrum sp.	4
	Other genera	8
	Total	60

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/25/73	1	5.7
	2	3.0
	3	5.6
	4	5.9
09/17/73	1	2.2
	2	1.3
	3	1.8
	4	4.2
11/13/73	1	0.5
	2	1.3
	3	1.2
	4	1.3

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.160	0.1
0.010 P	0.015	0.160	0.2
0.020 P	0.025	0.160	2.4
0.050 P	0.055	0.160	4.5
0.025 P + 0.5 N	0.030	0.660	8.1
0.050 P + 1.0 N	0.055	1.160	19.2
1.0 N	0.005	1.160	0.2

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Lake Keowee was low at the time the sample was collected (06/25/73). Also, the significant increases in yields with increasing amounts of orthophosphorus and the lack of increase when only nitrogen was added indicate phosphorus limitation at that time.

The lake data also indicate phosphorus limitation; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 34/1 or greater at all sampling times, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the South Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of January when two samples were collected. Sampling was begun in February, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the South Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were calculated using mean concentrations and mean flows. The nutrient loads shown for Cane Creek are those measured minus the Walhalla point-source loads.

The Keowee River upstream from the lake was not accessible for sampling, and nutrient loads in the river and the unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations C-1, E-1, F-1, and G-1 and multiplying the means by the Keowee River and ZZ areas in km^2.

The operator of the Walhalla wastewater treatment plant provided monthly effluent samples but could not provide flow data. Therefore,

nutrient loads were calculated using the means of the nutrient concentrations in the samples submitted (Appendix E) and the mean plant flow reported by the South Carolina Department of Health and Environmental Control (Anonymous, 1973).

A. Waste Sources*:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Walhalla	2,530	aer. pond	1,022.0**	Cane Creek

In addition, there are at least six privately-owned domestic-waste facilities in the Lake Keowee drainage. The nutrient impact of these small facilities is not known, but three of them discharge to sampled tributaries and nutrient contributions are included in the loads attributed to the streams.

2. Known industrial - There are at least seven industrial waste treatment facilities of unknown significance in the drainage. Three of these discharge to sampled tributaries and nutrient contributions, if any, are included in the stream loads.

* Foley, 1976.
** Anonymous, 1973.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Keowee River	10,115	46.8
Little River	3,315	15.3
Eastatoe Creek	2,080	9.6
Cane Creek	1,195	5.5
Cedar Creek	380	1.8
Little Eastatoe Creek	455	2.1
b. Minor tributaries & immediate drainage (non-point load) -	1,395	6.5
c. Known municipal STP's -		
Walhalla	1,475	6.8
d. Septic tanks - Unknown	?	-
e. Known industrial -	?	-
f. Direct precipitation* -	1,215	5.6
Total	21,625	100.0

2. Outputs -

Lake outlet - Seneca River 16,900

3. Net annual P accumulation - 4,725 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Keowee River	175,345	42.7
Little River	57,935	14.1
Eastatoe Creek	23,850	5.8
Cane Creek	29,390	7.2
Cedar Creek	4,725	1.2
Little Eastatoe Creek	15,050	3.7
b. Minor tributaries & immediate drainage (non-point load) -	24,180	5.9
c. Known municipal STP's -		
Walhalla	4,905	1.2
d. Septic tanks - Unknown	?	-
e. Known industrial -	?	-
f. Direct precipitation** -	74,935	18.2
Total	410,315	100.0

2. Outputs -

Lake outlet - Seneca River 452,275

3. Net annual N loss - 41,960 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Little River	18	314
Eastatoe Creek	19	212
Cane Creek	15	366
Cedar Creek	19	237
Little Eastatoe Creek	15	484

* See Working Paper No. 175.

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	0.31	0.07	5.9	loss*

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Lake Keokee:	
"Dangerous" (eutrophic loading)	0.72
"Permissible" (oligotrophic loading)	0.36

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, or unsampled point sources discharging directly to the lake or to unsampled tributaries. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's former National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
4503	FISHING CREEK RESERVOIR	0.143	0.535	483.000	2.811	10.200	0.051
4504	LAKE GREENWOOD	0.061	0.470	463.917	8.150	15.000	0.011
4505	LAKE HARTWELL	0.013	0.130	422.000	6.157	15.000	0.004
4506	LAKE MARION	0.055	0.280	470.176	8.728	14.900	0.010
4507	LAKE MURRAY	0.024	0.260	424.905	6.478	15.000	0.007
4508	LAKE ROBINSON	0.014	0.260	458.778	8.611	14.000	0.005
4510	LAKE WATEREE	0.094	0.450	475.667	8.408	14.100	0.034
4511	LAKE WYLIE	0.045	0.380	462.222	5.422	14.800	0.013
4512	LAKE MOULTRIE	0.026	0.200	455.36	8.800	11.200	0.006
4513	LAKE KEOWEE	0.008	0.170	371.750	2.833	15.000	0.003
4514	LAKE SECESSION	0.057	0.355	462.778	10.722	15.000	0.006
4515	SALUDA LAKE	0.046	0.230	476.833	1.517	10.800	0.006
4516	LAKE WILLIAM C. BOWEN	0.022	0.360	459.889	3.911	15.000	0.007

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4503	FISHING CREEK RESERVOIR	0 (0)	0 (0)	0 (0)	92 (11)	100 (12)	0 (0)	192
4504	LAKE GREENWOOD	17 (2)	8 (1)	33 (4)	42 (5)	21 (0)	25 (3)	146
4505	LAKE HARTWELL	92 (11)	100 (12)	92 (11)	58 (7)	21 (0)	92 (11)	455
4506	LAKE MARION	33 (4)	50 (6)	25 (3)	17 (2)	50 (6)	33 (4)	208
4507	LAKE MURRAY	67 (8)	62 (7)	83 (10)	50 (6)	21 (0)	46 (5)	329
4508	LAKE ROBINSON	83 (10)	62 (7)	67 (8)	25 (3)	75 (9)	83 (10)	395
4510	LAKE WATEREE	8 (1)	17 (2)	17 (2)	33 (4)	67 (8)	8 (1)	150
4511	LAKE WYLIE	50 (6)	25 (3)	50 (6)	67 (8)	58 (7)	17 (2)	267
4512	LAKE MOULTRIE	58 (7)	83 (10)	75 (9)	8 (1)	83 (10)	71 (8)	378
4513	LAKE KEOWEE	100 (12)	92 (11)	100 (12)	83 (10)	21 (0)	100 (12)	496
4514	LAKE SECESSION	25 (3)	42 (5)	42 (5)	0 (0)	21 (0)	58 (7)	188
4515	SALUDA LAKE	42 (5)	75 (9)	8 (1)	100 (12)	92 (11)	71 (8)	388
4516	LAKE WILLIAM C. BOWEN	75 (9)	33 (4)	58 (7)	75 (9)	21 (0)	46 (5)	308

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	4513	LAKE KEOWEE	496
2	4505	LAKE HARTWELL	455
3	4508	LAKE ROBINSON	395
4	4515	SALUDA LAKE	388
5	4512	LAKE MOULTRIE	378
6	4507	LAKE MURRAY	329
7	4516	LAKE WILLIAM C. BOWEN	308
8	4511	LAKE WYLIE	267
9	4506	LAKE MARION	208
10	4503	FISHING CREEK RESERVOIR	192
11	4514	LAKE SECESSION	188
12	4510	LAKE WATEREE	150
13	4504	LAKE GREENWOOD	146

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR SOUTH CAROLINA 04/27/76

LAKE CODE 4513 LAKE KEOWEE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 1137.0

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
4513A1	1137.0	34.55	43.61	47.57	39.93	30.30	27.33	26.56	24.66	23.53	24.83	26.56	29.73	31.52
4513B1	80.3	2.10	2.74	3.03	3.11	2.15	1.67	1.42	1.30	1.10	1.53	1.39	2.07	1.97
4513C1	184.4	4.93	6.46	7.08	7.25	5.04	3.71	3.31	3.03	2.61	3.54	3.26	4.81	4.57
4513D1	562.0	20.53	26.90	29.45	30.02	21.01	16.08	13.90	12.69	10.76	14.78	13.56	20.08	19.10
4513E1	112.4	2.94	3.88	4.25	4.36	3.03	2.32	1.98	1.81	1.56	2.12	1.95	2.89	2.75
4513F1	19.9	0.51	0.68	0.74	0.76	0.54	0.40	0.34	0.31	0.28	0.37	0.34	0.51	0.48
4513G1	31.1	0.82	1.08	1.16	1.19	0.82	0.65	0.54	0.51	0.42	0.59	0.54	0.79	0.76
4513ZZ	77.4	2.04	2.66	2.92	3.00	2.07	1.59	1.36	1.25	1.08	1.47	1.36	1.98	1.89

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 1137.0
SUM OF SUB-DRAINAGE AREAS = 1067.5
TOTAL FLOW IN = 379.18
TOTAL FLOW OUT = 379.16

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4513A1	2	73	18.123	10	18.972				
	3	73	30.865	13	56.634				
	4	73	30.582	6	45.307				
	5	73	32.564	4	33.980				
	6	73	54.935	1	42.475				
	7	73	10.477	2	32.848				
	8	73	16.990	6	1.416				
	9	73	18.123	5	18.406				
	10	73	3.398	11	1.416				
	11	73	5.947	6	14.158				
	12	73	18.123	4	14.158				
	1	74	79.287	4	56.634	18	5.663		
	2	74	82.119	1	33.980				
4513B1	2	73	3.256	10	3.171				
	3	73	3.625	13	3.511				
	4	73	3.540	6	3.851				
	5	73	4.531	4	2.973				
	6	73	2.464	1	3.964				
	7	73	1.642	2	2.322				
	8	73	1.586	6	1.841				
	9	73	1.019	5	1.359				
	10	73	0.793	11	0.736				
	11	73	0.821	6	0.765				
	12	73	1.982	4	0.934				
	1	74	2.803	4	3.511	18	1.586		
	2	74	2.549	1	2.095				

TRIBUTARY FLOW INFORMATION FOR SOUTH CAROLINA 04/27/76

LAKE CODE 4513 LAKE KEOWEE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4513C1	2	73	9.288	10	7.249				
	3	73	10.506	13	8.070				
	4	73	10.194	6	8.835				
	5	73	13.366	4	6.909				
	6	73	7.164	1	9.090				
	7	73	4.786	2	5.352				
	8	73	4.672	6	4.219				
	9	73	2.973	5	3.115				
	10	73	2.322	11	2.067				
	11	73	2.577	6	2.124				
	12	73	6.400	4	2.832				
	1	74	8.835	4	11.440	18	5.125		
	2	74	9.684	1	6.796				
4513D1	2	73	20.105	10	15.574				
	3	73	22.937	13	16.990				
	4	73	22.087	6	18.972				
	5	73	31.715	4	14.725				
	6	73	15.574	1	19.255				
	7	73	10.477	2	11.327				
	8	73	10.194	6	9.061				
	9	73	6.513	5	6.654				
	10	73	5.097	11	4.955				
	11	73	5.239	6	5.097				
	12	73	11.327	4	5.380				
	1	74	27.751	4	6.371	18	11.893		
	2	74	26.051	1	10.760				
4513E1	2	73	4.531	10	4.417				
	3	73	5.097	13	4.927				
	4	73	4.955	6	5.380				
	5	73	6.371	4	4.191				
	6	73	3.455	1	5.522				
	7	73	2.322	2	3.256				
	8	73	2.237	6	2.577				
	9	73	1.444	5	1.897				
	10	73	1.104	11	1.048				
	11	73	1.161	6	1.076				
	12	73	2.832	4	1.303				
	1	74	3.936	4	4.927	18	2.209		
	2	74	3.540	1	2.945				
4513F1	2	73	0.793	10	0.793				
	3	73	0.906	13	0.878				
	4	73	0.850	6	0.963				
	5	73	1.133	4	0.736				
	6	73	0.595	1	0.991				
	7	73	0.396	2	0.566				
	8	73	0.368	6	0.453				
	9	73	0.255	5	0.340				
	10	73	0.198	11	0.198				
	11	73	0.198	6	0.198				
	12	73	0.510	4	0.227				
	1	74	0.708	4	0.878	18	0.396		
	2	74	0.623	1	0.510				

TRIBUTARY FLOW INFORMATION FOR SOUTH CAROLINA 04/27/76

LAKE CODE 4513 LAKE KEOWEE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4513G1	2	73	1.246	10	1.218				
	3	73	1.416	13	1.359				
	4	73	1.359	6	1.472				
	5	73	1.784	4	1.161				
	6	73	0.934	1	1.529				
	7	73	0.623	2	0.906				
	8	73	0.595	6	0.708				
	9	73	0.396	5	0.510				
	10	73	0.311	11	0.283				
	11	73	0.311	6	0.283				
	12	73	0.793	4	0.368				
	1	74	1.076	4	1.359	18	0.623		
	2	74	0.963	1	0.821				
4513ZZ	2	73	2.832	10	3.058				
	3	73	3.398	13	3.398				
	4	73	3.256	6	3.681				
	5	73	4.248	4	2.832				
	6	73	2.265	1	3.681				
	7	73	1.557	2	2.237				
	8	73	1.416	6	1.756				
	9	73	0.991	5	1.274				
	10	73	0.765	11	0.708				
	11	73	0.793	6	0.736				
	12	73	1.954	4	0.878				
	1	74	2.718	4	3.398	18	1.529		
	2	74	2.435	1	2.039				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/04/27

451301
34 44 05.0 082 54 45.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0120 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/25	09	55 0000	28.6		144	50K	6.50	21	0.040	0.400	0.130	0.002
	09	55 0005	28.5	7.8		50K	6.50	15	0.020	0.200K	0.120	0.002
	09	55 0012	28.0	8.4		50K	6.50	16	0.030	0.200	0.120	0.002K
	09	55 0022	19.8	6.6		50K	6.50	17	0.050	0.200K	0.130	0.002K
	09	55 0035	15.8	6.9		50K	6.40	14	0.060	0.200K	0.140	0.002
	09	55 0055	12.8	7.0		50K	6.40	16	0.050	0.200K	0.200	0.002K
	09	55 0085	10.7	5.4		50K	6.30	18	0.020	0.200K	0.270	0.002K
	09	55 0100	10.5	5.3		50K	6.30	19	0.050	0.200K	0.270	0.002
	09	55 0115	10.4	4.7		50K	6.30	20	0.070	0.200K	0.270	0.002
73/09/17	11	20 0000	27.2		128	34	6.50	12	0.050	0.200K	0.040	0.007
	11	20 0005	27.1	7.8		32	6.50	12	0.030	0.200K	0.040	0.005
	11	20 0020	24.4	6.0		28	6.10	11	0.040	0.200K	0.100	0.003
	11	20 0035	21.2	3.2		28	6.00	12	0.050	0.200K	0.140	0.004
	11	20 0060	14.5	3.6			6.00	12	0.040	0.300	0.240	0.004
	11	20 0075	10.0	5.0			6.00	13	0.030	0.200K	0.250	0.004
	11	20 0085	9.7	3.4		27	5.90	13	0.040	0.200	0.240	0.004
73/11/13	15	00 0000	19.8		132	37	6.60			0.200K		
	15	00 0010	19.8	7.0		34	6.40	17	0.080	0.200K	0.100	0.003
	15	00 0025	18.3	5.8		31	6.30	17	0.090	0.200K	0.080	0.003
	15	00 0050	17.8	4.6		31	6.20	16	0.090	0.200K	0.090	0.003
	15	00 0070	15.6	3.0		31	6.00	17	0.070	0.200K	0.120	0.008
	15	00 0090	9.8	2.0		29	6.00	17	0.040	0.200K	0.230	0.003
	15	00 0120	9.3	1.8		28	6.00	19	0.100	0.200K	0.120	0.004

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

451301
34 44 05.0 082 54 45.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0120 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/25	09 55	0000	0.010	5.7
	09 55	0005	0.008	
	09 55	0012	0.010	
	09 55	0022	0.016	
	09 55	0035	0.008	
	09 55	0055	0.008	
	09 55	0085	0.007	
	09 55	0100	0.014	
	09 55	0115	0.006	
73/09/17	11 20	0000	0.007	2.2
	11 20	0005	0.008	
	11 20	0020	0.006	
	11 20	0035	0.004	
	11 20	0060	0.004	
	11 20	0075	0.004	
	11 20	0085	0.005	
73/11/13	15 00	0000	0.007	0.5
	15 00	0010	0.006	
	15 00	0025	0.009	
	15 00	0050	0.009	
	15 00	0070	0.009	
	15 00	0090	0.006	
	15 00	0120	0.006	

STORET RETRIEVAL DATE 76/04/27

451302
34 49 59.0 082 53 25.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0098 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/25	13	15 0000	29.0		114	50K	6.60	13	0.070	0.500	0.100	0.003
	13	15 0005	28.9	7.6		50K	6.70	12	0.040	0.200	0.100	0.002
	13	15 0010	28.5	7.8		50K	6.80	14	0.070	0.200K	0.100	0.003
	13	15 0024	19.4	7.2		50K	6.60	16	0.060	0.200K	0.160	0.002K
	13	15 0035	15.8	6.8		50K	6.60	15	0.070	0.200K	0.170	0.002K
	13	15 0050	12.4	7.0		50K	6.50	16	0.080	0.200K	0.160	0.002
	13	15 0070	10.6	6.7		50K	6.90	15	0.060	0.200K	0.200	0.007
	13	15 0095	9.9	6.4		50K	6.70	15	0.050	0.200K	0.210	0.003
73/09/17	11	00 0000	26.9		124	32	6.30	10	0.040	0.200K	0.050	0.007
	11	00 0005	26.8	7.4		32	6.10	10K	0.040	0.200K	0.050	0.005
	11	00 0015	25.5	6.0		32	6.00	10K	0.040	0.200K	0.080	0.005
	11	00 0025	22.9	4.4		30	6.00	10	0.040	0.200K	0.120	0.004
	11	00 0045	20.5	3.8		29	5.90	11	0.050	0.200K	0.150	0.005
	11	00 0065	15.0	2.6			5.90	11	0.040	0.200K	0.200	0.004
	11	00 0082	10.8	3.6		25	5.90	11	0.030	0.200K	0.220	0.006
73/11/13	15	30 0000	15.9		180	13	6.50	13	0.030	0.200K	0.030	0.004
	15	30 0010	15.9	8.8		17	6.30	13	0.020	0.200K	0.020	0.005
	15	30 0025	15.8	8.8		14	6.30	11	0.030	0.200K	0.020	0.003
	15	30 0055	15.7	8.4		15	6.30	10	0.020	0.200K	0.020	0.003
	15	30 0075	10.5	3.0		15	6.00	11	0.020	0.200K	0.080	0.004
	15	30 0100	8.8	3.6		15	5.80	12	0.030	0.200K	0.100	0.005
	15	30 0130	8.3	3.0		17	5.80	11	0.020	0.200K	0.100	0.003
	15	30 0160	8.1	3.0		18	5.80	10	0.020	0.200K	0.100	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

451302
34 49 59.0 082 53 25.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0098 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/25	13 15	0000	0.010	3.0
	13 15	0005	0.008	
	13 15	0010	0.009	
	13 15	0024	0.009	
	13 15	0035	0.008	
	13 15	0050	0.007	
	13 15	0070	0.008	
	13 15	0095	0.008	
73/09/17	11 00	0000	0.010	1.3
	11 00	0005	0.009	
	11 00	0015	0.007	
	11 00	0025	0.007	
	11 00	0045	0.007	
	11 00	0065	0.007	
	11 00	0082	0.007	
73/11/13	15 30	0000	0.005	1.3
	15 30	0010	0.008	
	15 30	0025	0.006	
	15 30	0055	0.005	
	15 30	0075	0.005	
	15 30	0100	0.032	
	15 30	0130	0.014	
	15 30	0160	0.030	

STORET RETRIEVAL DATE 76/04/27

451303
34 51 00.0 082 54 05.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0108 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/25	14 35	0000	28.9		101	50K	7.00	15	0.050	0.200K	0.080	0.003
	14 35	0010	24.8	9.8		50K	7.10	17	0.050	0.200K	0.120	0.003
	14 35	0024	18.7	6.6		50K	6.90	17	0.060	0.200K	0.150	0.002
	14 35	0050	13.3	5.5		50K	6.80	17	0.050	0.200K	0.170	0.002
	14 35	0086	10.2	4.9		50K	6.60	17	0.040	0.200K	0.210	0.002
	14 35	0105	9.9	4.9		50K	6.50	19	0.040	0.200K	0.230	0.002K
73/09/17	10 25	0000	26.9		111	35	6.50	10	0.040	0.200	0.040	0.003
	10 25	0005	26.8	7.6		32	6.50	14	0.030	0.200K	0.040	0.004
	10 25	0015	25.0	5.0		30	6.00	10	0.040	0.200	0.110	0.004
	10 25	0025	22.7	3.6		30	5.90	10	0.040	0.200K	0.130	0.003
	10 25	0040	21.0	3.4		29	5.90	10	0.060	0.200K	0.140	0.004
	10 25	0055	18.8	1.8		25	5.70	10K	0.060	0.200K	0.130	0.003
	10 25	0065	14.8	0.8			5.80	10	0.030	0.200K	0.180	0.003
	10 25	0092	10.4	1.0		30	5.90	14	0.080	0.200K	0.180	0.010
73/11/13	16 30	0000	16.0		144	20	6.50	10K	0.040	0.500	0.020	0.003
	16 30	0010	16.0	9.4		16	6.40	10K	0.020	0.200K	0.020	0.003
	16 30	0025	15.9	8.8		16	6.40	10K	0.040	0.200K	0.040	0.002
	16 30	0055	15.7	5.4		16	5.90	10	0.020	0.200K	0.090	0.003
	16 30	0075	10.7	4.4		17	5.80	11	0.040	0.300	0.090	0.003
	16 30	0106	8.6	1.0		19	5.80	11	0.030	0.200K	0.090	0.003

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

451303
34 51 00.0 082 54 05.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0108 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/25	14 35	0000	0.008	5.6
	14 35	0010	0.009	
	14 35	0024	0.006	
	14 35	0050	0.006	
	14 35	0080	0.006	
	14 35	0105	0.006	
73/09/17	10 25	0000	0.007	1.8
	10 25	0005	0.009	
	10 25	0015	0.007	
	10 25	0025	0.007	
	10 25	0040	0.006	
	10 25	0055	0.007	
	10 25	0065	0.009	
	10 25	0092	0.010	
73/11/13	16 30	0000	0.007	1.2
	16 30	0010	0.006	
	16 30	0025	0.011	
	16 30	0055	0.019	
	16 30	0075	0.084	
	16 30	0106	0.013	

STORET RETRIEVAL DATE 76/04/27

451304
34 56 30.0 082 54 00.0 3
LAKE KEOWEE
45073 SOUTH CAROLINA
040391

11EPALES 2111202
0070 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/25	17 00	0000	29.0		81	50K	6.70	14	0.060	0.400	0.040	0.003
	17 00	0005	28.0	8.3		50K	6.90	16	0.050	0.200K	0.040	0.002
	17 00	0010	24.7	9.8		50K	7.10	16	0.050	0.200K	0.040	0.003
	17 00	0015	22.0	7.4		50K	6.90	16	0.070	0.200K	0.080	0.003
	17 00	0035	16.2	5.5		50K	6.70	13	0.060	0.200K	0.100	0.002
	17 00	0055	12.1	4.3		50K	6.40	16	0.050	0.200K	0.190	0.002
	17 00	0065	11.0	2.2		50K	6.30	18	0.050	0.200K	0.210	0.002
73/09/17	09 55	0000	27.1		100	30	6.90	10K	0.040	1.100	0.020	0.005
	09 55	0005	27.1	8.4		31	6.70	10K	0.030	0.600	0.020	0.005
	09 55	0015	24.8	6.4		30	6.10	10	0.030	0.500	0.070	0.006
	09 55	0025	22.8	3.4		31	6.00	11	0.050	0.200K	0.120	0.004
	09 55	0045	20.3	2.8		28	5.90	10	0.080	0.200K	0.120	0.003
	09 55	0069	14.1	0.0		51	6.10	15	0.370	0.500	0.020	0.002
73/11/13	17 00	0000	16.2		180	17	6.40	10K	0.030	0.400	0.020	0.002
	17 00	0025	16.1	8.0		15	6.30	10K	0.020	0.200K	0.020	0.002
	17 00	0055	16.0	8.0		13	6.30	10K	0.020	0.200K	0.020	0.002
	17 00	0100	9.1	1.3		15	5.90	10K	0.030	0.200K	0.080	0.002K
	17 00		8.0	1.3		17	5.60	10K	0.030	0.200K	0.080	0.002K

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/25	17 00	0000	0.009	5.9
	17 00	0005	0.011	
	17 00	0010	0.011	
	17 00	0015	0.018	
	17 00	0035	0.017	
	17 00	0055	0.008	
	17 00	0065	0.007	
73/09/17	09 55	0000	0.011	4.2
	09 55	0005	0.009	
	09 55	0015	0.009	
	09 55	0025	0.007	
	09 55	0045	0.007	
	09 55	0069	0.006	
73/11/13	17 00	0000	0.008	1.3
	17 00	0025	0.007	
	17 00	0055	0.006	
	17 00	0100	0.006	
	17 00		0.007	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/04/27

4513A1
34 47 30.0 082 53 00.0 4
SENECA RIVER
45 OCONEE CO HWY MA
0/LAKE KEOWEE 031391
ST HWY 183 BRDG 10 MI E OF WALHALL
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	11 00		0.072	0.185	0.078	0.005K	0.005K
73/03/13	13 15		0.110	0.190	0.080	0.005K	0.010
73/04/06	13 50		0.110	0.200	0.058	0.005K	0.025
73/05/04	15 45		0.105	0.930	0.120	0.013	0.020
73/06/01	15 30		0.120	1.100	0.092	0.005K	0.010
73/07/02	16 00		0.126	0.460	0.105	0.005K	0.005K
73/08/06	16 05		0.126	0.160	0.042	0.015	0.015
73/09/05	13 00		0.105	0.100K	0.048	0.005K	0.015
73/10/11	13 10		0.115	0.540	0.062	0.005K	0.007
73/11/06	13 15		0.132	0.200	0.056	0.006	0.015
73/12/04	13 00		0.108	0.100	0.036	0.005K	0.045
74/01/04	13 10		0.092	0.400	0.070	0.008	0.008
74/01/18	13 15		0.116	0.100K	0.052	0.005K	0.015
74/02/01	13 15		0.112	0.150	0.040	0.030	0.042

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

451381
34 45 00.0 083 01 00.0 4
CANE CREEK
45 OCONEE CO HWY MA
1/LAKE KEOWEE 031391
ST HWY 202 4RDG 4 MI E OF WALHALLA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	08 30		0.252	0.180	0.065	0.016	0.030
73/03/13	11 00		0.230	0.350	0.060	0.016	0.057
73/04/06	13 00		0.190	0.445	0.065	0.035	0.095
73/05/04	13 00		0.160	0.220	0.070	0.011	0.025
73/06/01	13 00		0.115	0.440	0.080	0.027	0.065
73/07/02	13 00		0.010K	0.630	0.018	0.005K	0.020
73/08/06	13 15		0.010K	0.350	0.017	0.008	0.020
73/09/05	15 55		0.010K	0.240	0.014	0.005K	0.025
73/10/11	12 40		0.012	0.460	0.024	0.005K	0.025
73/11/06	16 05		0.036	0.750	0.028	0.016	0.035
73/12/04	16 00		0.044	1.300	0.208	0.008	0.060
74/01/04	16 10		0.288	0.100	0.056	0.016	0.045
74/01/18	16 10		0.264	0.100	0.060	0.012	0.045
74/02/01	15 50		0.340	0.200	0.040	0.015	0.050

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

4513C1
34 50 00.0 082 58 30.0 4
LITTLE RIVER
4S OCONEE CO HWY MA
T/LAKE KEOWEE 031391
ST HWY 24 BRDG 3 MI S OF SALEM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	09	10	0.099	0.100K	0.023	0.005K	0.005K
73/03/13	11	20	0.100	0.100K	0.011	0.005K	0.020
73/04/06	13	30	0.080	0.170	0.013	0.005K	0.030
73/05/04	13	30	0.048	0.100K	0.014	0.006	0.010
73/06/01	13	30	0.081	0.830	0.044	0.007	0.040
73/07/02	13	25	0.069	0.970	0.033	0.005K	0.020
73/08/06	13	40	0.075	0.250	0.020	0.008	0.045
73/09/05	15	20	0.075	0.140	0.014	0.005K	0.015
73/10/11	15	05	0.069	1.230	0.052	0.005K	0.015
73/11/06	15	40	0.044	0.100K	0.016	0.008	0.020
73/12/04	15	25	0.064	0.100K	0.016	0.008	0.025
74/01/04	15	35	0.136	0.100	0.028	0.008	0.030
74/01/18	15	40	0.112	0.100K	0.024	0.005K	0.020
74/02/01	15	10	0.192	0.100K	0.015	0.005	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

4513E1
34 57 30.0 082 51 30.0 4
EASTATULE CREEK
45 PICKENS CO HWY M
T/LAKE KEOWEE 031391
HWY 143 BRDG 6 MI OCONEE-PICKENS CO LINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	10	10	0.052	0.100K	0.010	0.006	0.010
73/03/13	12	20	0.040	0.150	0.011	0.005K	0.025
73/04/06	14	30	0.042	0.200	0.019	0.007	0.030
73/05/04	14	40	0.010K	0.100K	0.006	0.010	0.020
73/06/01	14	35	0.052	1.380	0.040	0.008	0.040
73/07/02	14	30	0.023	0.310	0.037	0.006	0.030
73/08/06	14	35	0.035	0.160	0.015	0.008	0.030
73/09/05	14	15	0.010K	0.160	0.011	0.006	0.025
73/10/11	14	05	0.012	0.130	0.022	0.005K	0.020
73/11/06	14	30	0.012	0.200	0.028	0.008	0.015
73/12/04	14	10	0.020	0.100K	0.008	0.005K	0.020
74/01/04	14	40	0.088	0.100K	0.020	0.012	0.025
74/01/18	14	10	0.072	0.100K	0.022	0.005K	0.025
74/02/01	14	20	0.088	0.100K	0.010	0.005	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

4513F1
34 54 00.0 082 50 30.0 4
CEDAR CREEK
45 PICKENS CO HWY H
T/LAKE KEOWEE 031391
ST HWY 50 BRDG 8 MI W OF PICKENS
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	10 20		0.068	0.100K	0.011	0.005K	0.010
73/03/13	12 45		0.069	0.200	0.022	0.013	0.040
73/04/06	15 20		0.044	0.550	0.026	0.022	0.085
73/05/04	15 00		0.035	0.100K	0.007	0.009	0.015
73/06/01	14 50		0.029	0.910	0.022	0.005K	0.025
73/07/02	15 20		0.010K	0.230	0.012	0.005K	0.015
73/08/06	15 10		0.027	0.240	0.035	0.006	0.015
73/09/05	13 35		0.010K	0.190	0.007	0.005K	0.010
73/10/11	13 55		0.010K	0.580	0.020	0.010	0.015
73/11/06	13 40		0.060	0.100K	0.028	0.005K	0.005K
73/12/04	13 25		0.072	0.200	0.044	0.005K	0.025
74/01/04	13 45		0.080	0.100	0.024	0.012	0.030
74/01/18	13 40		0.084	0.100K	0.020	0.005K	0.025
74/02/01	13 40		0.076	0.100	0.015	0.010	0.035

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/04/27

45138A PU45138A P002530
34 46 25.0 083 03 50.0 4
#ALHALLA
45 7.5 #ALHALLA
T/LAKE KEOWEE 031391
CANE CREEK
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/11	10 00		0.200	12.000	4.000	2.700	3.900		
73/07/10	14 00		0.100	14.000	3.000	3.600	5.100		
73/08/14	16 00		0.074	13.200	4.920	4.300	6.100		
73/09/14	15 30		0.180	11.500	1.560	4.140	5.300		
73/10/11	00 00		0.160	13.500	4.400	5.300	7.100		
73/12/11	14 00		0.260	13.000	4.600	3.560	5.300		
74/01/10	10 00		0.200	8.700	3.400	2.080	3.800		
74/04/18	09 30		0.280	11.000	3.450	2.600	4.800		
74/05/15	10 30		0.240	16.000	4.900	2.700	5.100		
74/06/21	14 30		0.078	16.000	4.600	2.900	4.800		
74/07/10	16 15		0.092	15.500	5.600	3.200	5.400		

STORET RETRIEVAL DATE 76/04/27

4513G1
34 56 30.0 082 51 30.0 4
LITTLE EASTATOE CREEK
45 PICKENS CO HWY M
T/LAKE KEOWEE 031391
BRDG ON RT 11 .5 MI N OF CEDAR CREEK MTN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/02/10	09 55		0.088	0.100K	0.010	0.005K	0.005K
73/03/13	12 15		0.075	0.230	0.017	0.005K	0.020
73/04/06	14 10		0.088	0.130	0.018	0.006	0.035
73/05/04	14 30		0.027	0.100K	0.007	0.007	0.010
73/06/01	14 20		0.088	1.260	0.074	0.005K	0.030
73/07/02	14 20		0.040	0.135	0.037	0.005K	0.015
73/08/06	14 15		0.037	0.110	0.023	0.006	0.015
73/09/05	14 00		0.031	0.135	0.019	0.005K	0.015
73/10/11	13 50		0.044	4.400	0.115	0.005K	0.015
73/11/06	14 15		0.012	0.150	0.012	0.005K	0.005K
73/12/04	13 50		0.052	0.100K	0.052	0.008	0.035
74/01/04	14 20		0.136	0.400	0.064	0.012	0.030
74/01/16	14 30		0.096	0.100K	0.012	0.005K	0.015

K VALUE KNOWN TO BE
LESS THAN INDICATED